

Full 126
What is claimed is:

1. Crystalline solid pantoprazole characterized by a powder X-ray diffraction pattern having peaks at 6.6, 13.2, 13.7, 15.7, 23.1, and $23.4 \pm 0.2^\circ 2\theta$.
2. The crystalline solid pantoprazole of claim 1 further having peaks in the powder X-ray diffraction pattern at 20.1, 20.9, 25.9, 27.5, $29.1 \pm 0.2^\circ 2\theta$.
3. The crystalline solid pantoprazole of claim 1 having a powder X-ray diffraction pattern substantially as depicted in Figure 1.
4. The crystalline solid pantoprazole of claim 1 having an infrared spectrum with bands at 1385, 1264, 1244, 1180, and 1027 cm^{-1} .
5. The crystalline solid pantoprazole of claim 4 having an infrared spectrum substantially as depicted in Figure 2.
6. A process for preparing the crystalline solid pantoprazole of claim 1, comprising
 - a) dissolving pantoprazole in a solvent;
 - b) precipitating crystals of the pantoprazole of claim 1 from the solution; and
 - c) separating the crystals from the solvent.
7. The process of claim 6, wherein the solvent is selected from the group consisting of ethanol, n-propanol, and acetone.
8. The process of claim 6, wherein the solution is heated before precipitating the crystals.
9. The process of claim 8, wherein the solution is then cooled to precipitate the crystals.

10. A process for preparing the crystalline solid pantoprazole of claim 1, comprising
- forming a slurry of amorphous pantoprazole in a diluent;
 - maintaining the slurry for a period of time sufficient to convert the
5 amorphous pantoprazole to the pantoprazole of claim 1; and
 - separating the pantoprazole of claim 1 from the diluent.
11. The process of claim 10, wherein the slurry is maintained for at least twelve hours.
- 10 12. The process of claim 10, wherein the diluent is selected from the group consisting of ethanol, acetone, n-propanol, ethyl acetate, tetrahydrofuran, sec-butanol, dimethylcarbonate, mixtures of methyl tert butyl ether and water, mixtures of dimethylcarbonate and water, mixtures of sec butanol and water, and mixtures of dichloromethane and water.
- 15 13. Crystalline solid pantoprazole characterized by a powder X-ray diffraction pattern having peaks at 5.8, 7.5, 9.3, 15.0, 22.0, and $22.6 \pm 0.2^\circ 2\theta$.
14. The crystalline solid pantoprazole of claim 13 further having peaks in the powder X-
20 ray diffraction pattern at 17.3, 18.6, 19.4, 20.8, 24.0, 24.8, and $25.5 \pm 0.2^\circ 2\theta$.
15. The crystalline solid pantoprazole of claim 13 having a powder X-ray diffraction pattern substantially as depicted in Figure 3.
- 25 16. The crystalline solid pantoprazole of claim 13 having an infrared spectrum having bands at 3195, 1196, and 1584 at cm^{-1} .
17. The crystalline solid pantoprazole of claim 16 having an infrared spectrum substantially as depicted in Figure 4.
- 30 18. The crystalline solid pantoprazole of claim 13 having a melting endotherm at about

143°C to about 146°C.

19. A process for preparing the crystalline solid pantoprazole of claim 13, comprising
- forming a slurry of amorphous pantoprazole in a diluent;
 - maintaining the slurry for a period of time sufficient to convert the amorphous pantoprazole to the pantoprazole of claim 13; and
 - separating the pantoprazole of claim 13 from the diluent.
20. The process of claim 19, wherein the slurry is maintained for about twenty-four hours.
21. The process of claim 19, wherein the solvent is selected from the group consisting of diethyl ether and tert-butyl methyl ether.
22. A process for preparing a mixture of the crystalline solids pantoprazole of claims 1 and 13 comprising:
- forming a slurry of amorphous pantoprazole in a diluent;
 - maintaining the slurry for a period of time sufficient to convert the amorphous pantoprazole to the pantoprazole of claims 1 and 13;
 - separating the pantoprazole of claims 1 and 13 from the diluent.
- ~~23~~
~~24.~~ The process of claim 22, wherein the slurry is maintained for at least about twenty-four hours.
- ~~24~~
~~25.~~ The process of claim 22, wherein the diluent is selected from the group consisting of mixtures of toluene and water, and methyl tert butyl ether.
- ~~25~~
~~26.~~ Amorphous pantoprazole.
- ~~26~~
~~27.~~ A process for preparing the amorphous pantoprazole of claim ~~26~~²⁵, comprising
- partitioning pantoprazole between the organic and aqueous phases of a

biphasic mixture of a water-immiscible organic liquid and water;

- b) adding acid to the mixture;
- c) separating the organic phase and the water; and
- d) recovering amorphous pantoprazole from the organic phase.

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~~27~~
~~28~~ The process of claim ~~27~~²⁶, wherein pantoprazole is partitioned by adding pantoprazole sodium to the mixture.

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~~28~~
~~29~~ The process of claim ~~27~~²⁶, wherein the amorphous pantoprazole is recovered by evaporating the organic liquid.

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~~30~~ The process of claim ~~27~~²⁶, wherein the organic liquid is dichloromethane.

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~~31~~ The process of claim ~~27~~²⁶, wherein the acid is acetic acid.

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~~32~~ A process for preparing a salt of pantoprazole comprising converting the pantoprazole of any of claims 1, 13, and ~~26~~²⁵ to a salt of pantoprazole.

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~~33~~ A salt of pantoprazole prepared by the process of claim ~~32~~³¹.

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~~34~~ The process of claim ~~32~~³¹, wherein the salt is pantoprazole sodium.

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~~35~~ Pantoprazole sodium prepared by the process of claim ~~34~~³³.

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~~35~~
~~36~~ A process for preparing a salt of pantoprazole comprising:
a) stirring pantoprazole of any of claims 1, 13, and ~~26~~²⁵ with ethyl acetate and aqueous sodium hydroxide; and
b) isolating pantoprazole sodium.

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~~37~~ Pantoprazole sodium prepared by the process of claim ~~36~~³⁵.

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~~38.~~ The product of claim ~~37~~³⁶, wherein the pantoprazole sodium is sesquihydrate.

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~~39.~~ The process of claim ~~36~~³⁵, wherein the pantoprazole is the pantoprazole of claim 1.

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~~40.~~ The process of claim ~~36~~³⁵, wherein the mixture is stirred overnight at room temperature.

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~~41.~~ A pharmaceutical composition comprising the pantoprazole of any of claims 1, 13,
10 and ~~25~~²⁵ and a pharmaceutical excipient.

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~~42.~~ The pharmaceutical composition of claim ~~41~~⁴⁰ that is a solid.

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~~43.~~ The pharmaceutical composition of claim ~~42~~⁴¹ that is a tablet.

15 ~~43~~
~~44.~~ The pharmaceutical composition of claim ~~41~~⁴⁰ that is a liquid.

~~44~~
~~45.~~ A method of inhibiting gastric acid secretion in the stomach of a patient comprising
20 administering to the patient the pantoprazole of any of claims 1, 13, and ~~25~~²⁵.

~~45~~
~~46.~~ A pharmaceutical composition comprising the pantoprazole of any of claims ~~33~~³², ~~37~~³⁶,
and ~~38~~³⁷ and a pharmaceutical excipient.

~~46~~
~~47.~~ The pharmaceutical composition of claim ~~46~~⁴⁵ that is a solid.

25 ~~47~~
~~48.~~ The pharmaceutical composition of claim ~~47~~⁴⁶ that is a tablet.

~~48~~
~~49.~~ The pharmaceutical composition of claim ~~46~~⁴⁵ that is a liquid.

30 ~~49~~
~~50.~~ A method of inhibiting gastric acid secretion in the stomach of a patient comprising
administering to the patient the pantoprazole of any of claims ~~33~~³², ~~37~~³⁶, and ~~38~~³⁷.